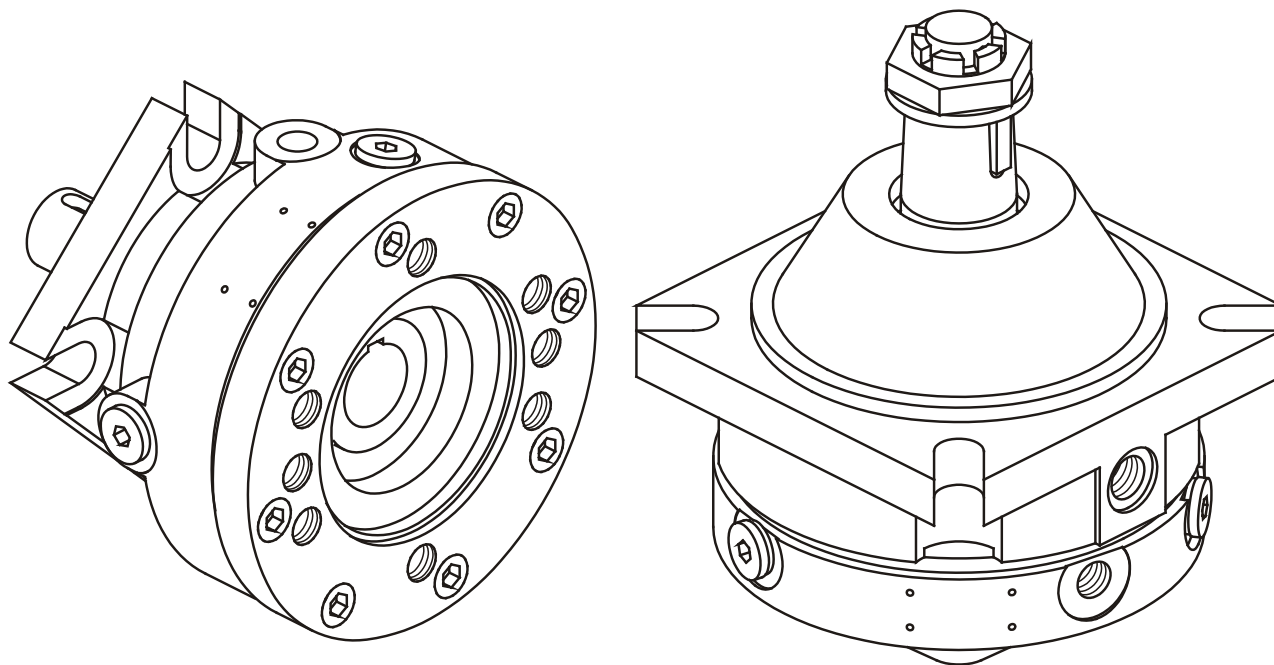
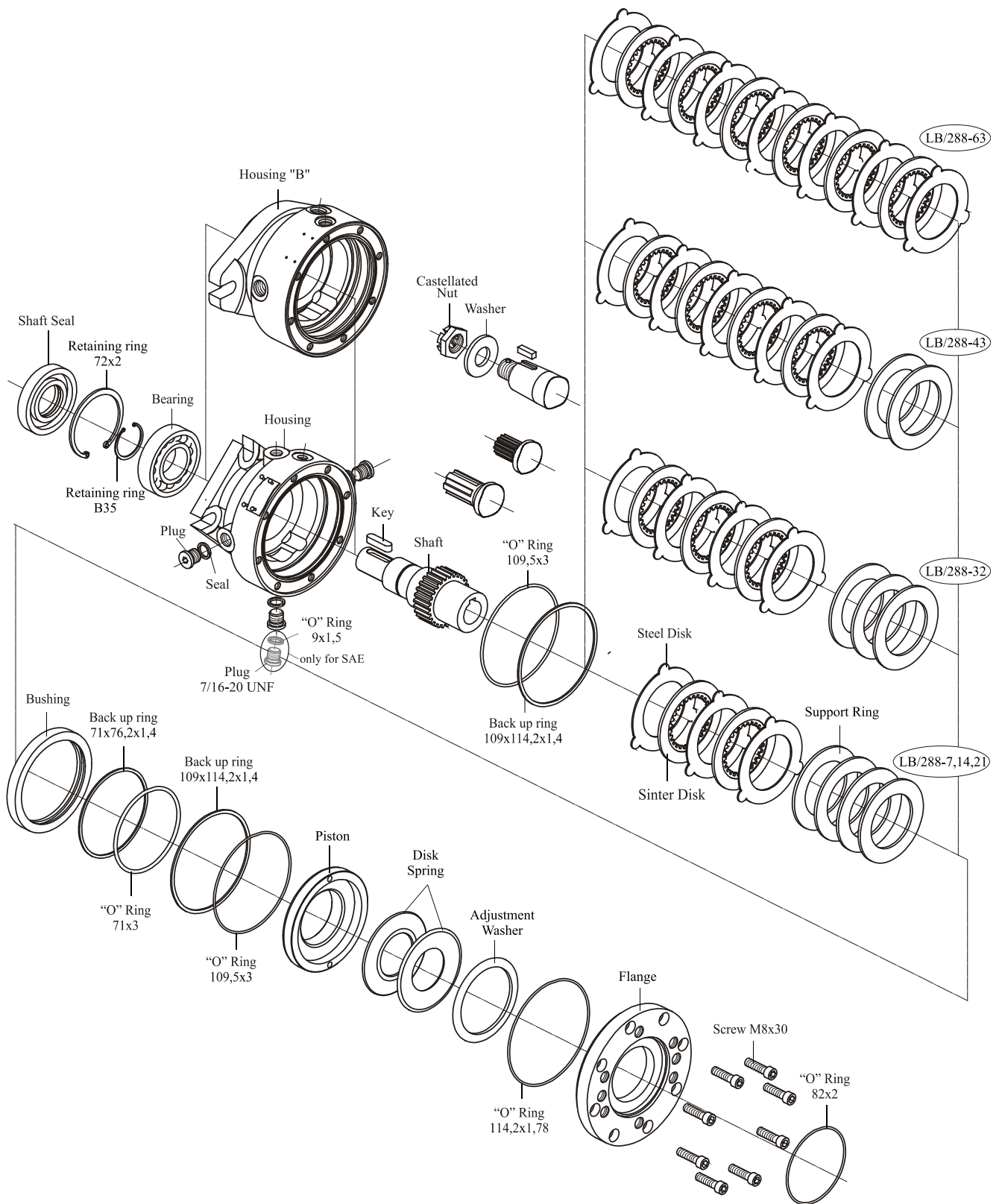
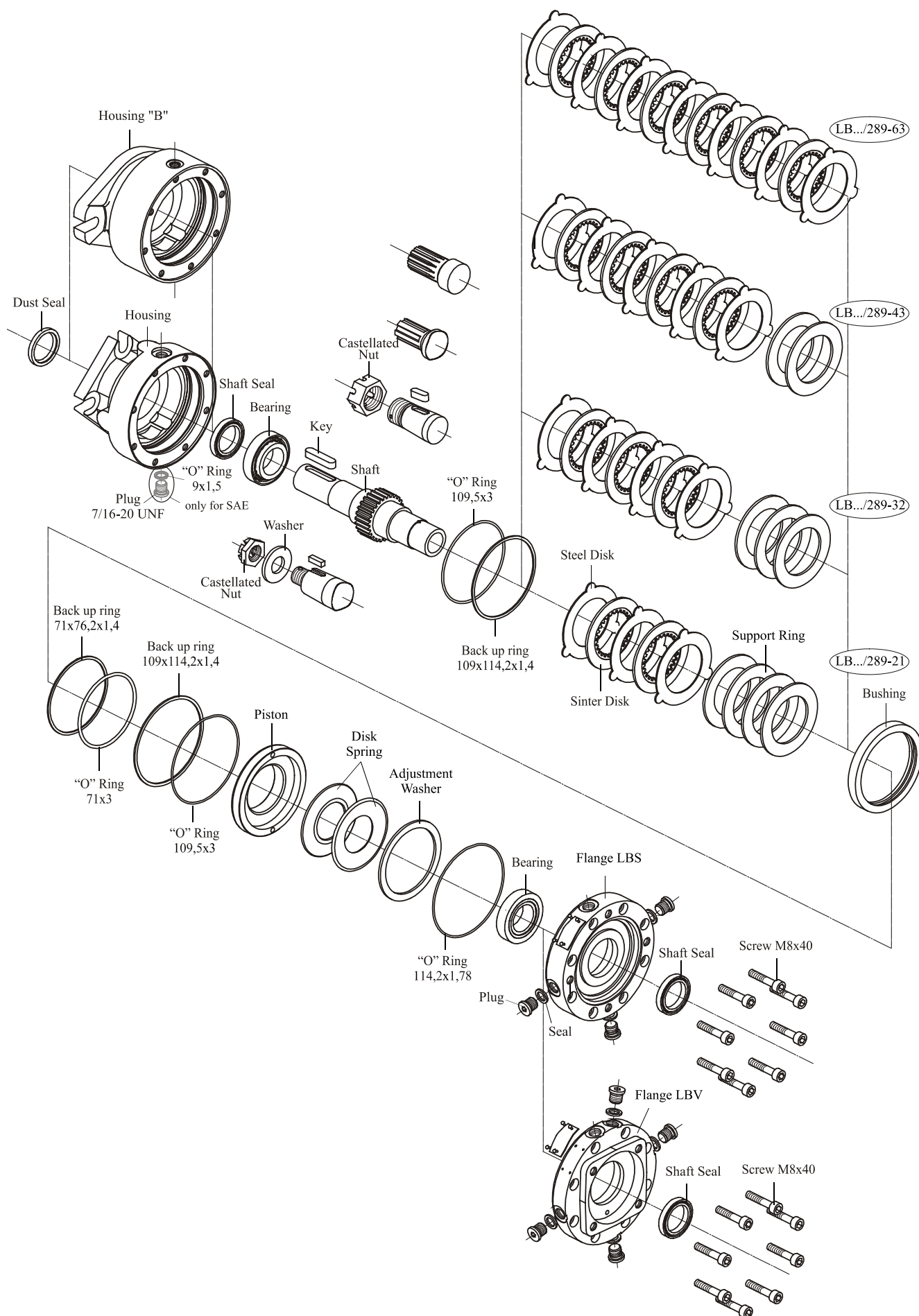


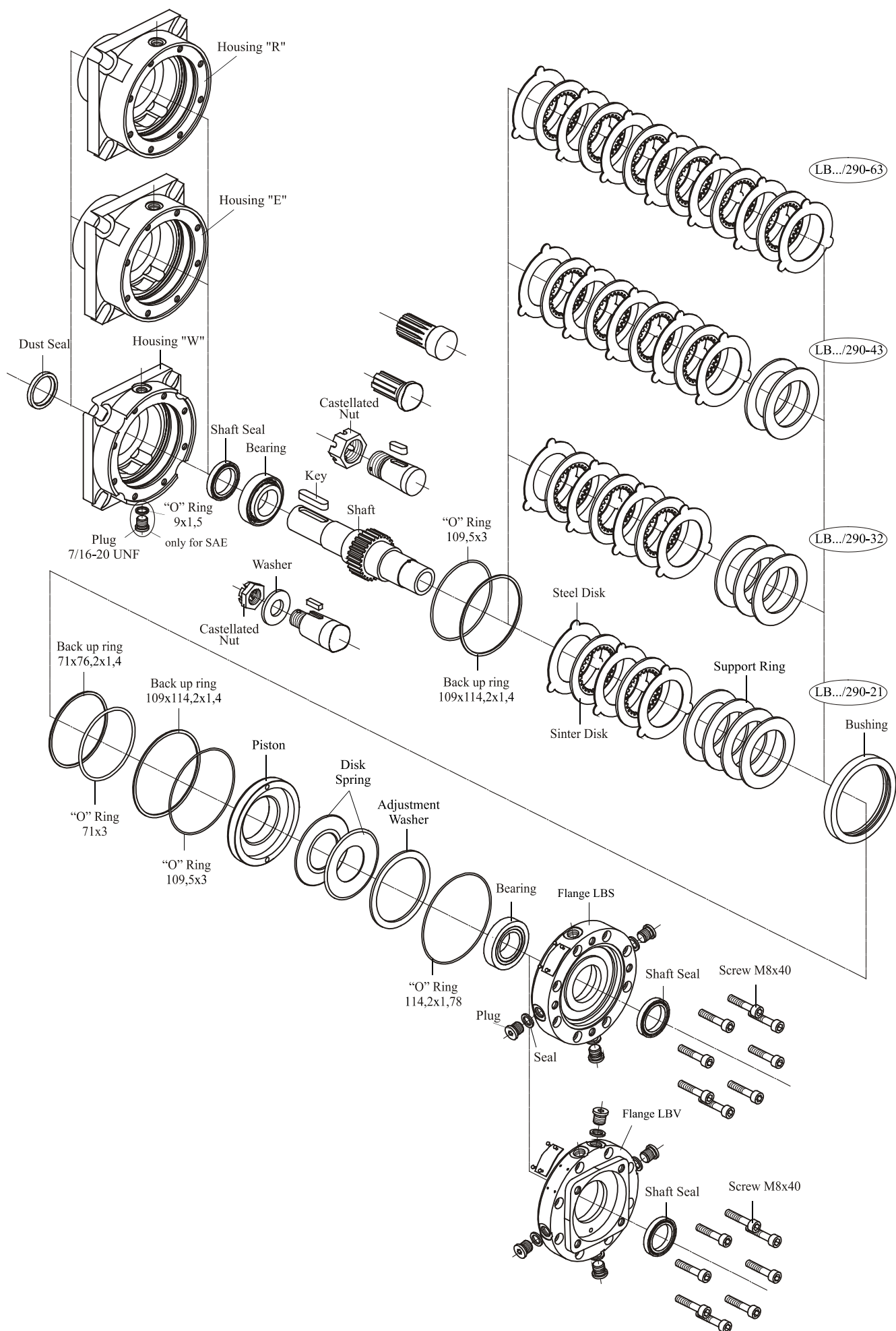
SERVICE MANUAL

Hydraulic Brakes type LB/288..., LBS[V]/289 and
LBS[V]/290 - series 4
Euro and SAE versions









Instructions in this manual are for brakes type LB...

Cleanliness is extremely important when repairing these brakes. Work in clean area!

Before disassembly, drain oil from brake.

If there is castellated nut, washer or key, they have to be removed from the shaft.

Although not all drawings show the brakes in disassembly devise, we recommend that you keep brake clamped during disassembly.

For LBS[V]/289 and LBS[V]/290:

1. Unscrew plugs (3 pcs. for LB/288 and LBS, 4 pcs. for LBV) using S6 Allen head spanner and set them in order aside incl. seals.

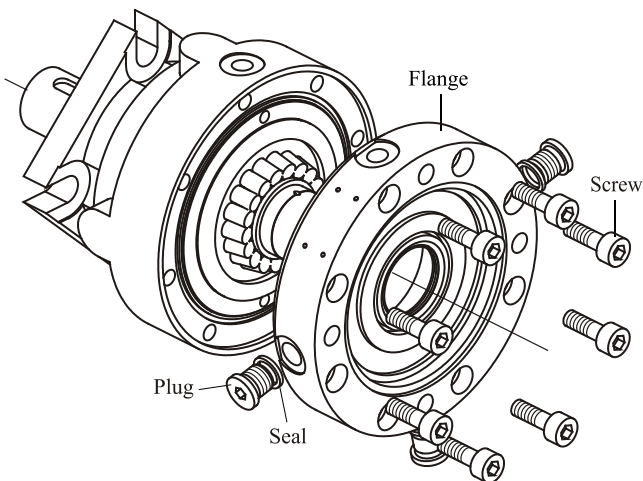


Fig.1

2. Place the brake in disassembly devise (plate with central hole $\varnothing 83$ for LB/288, 289 or $\varnothing 125$ ($\varnothing 127$) for LBS(LBV)/290 with two pins opposite staved into it) with the output shaft directed downwards. Unscrew screws (8 pcs.) using Allen head spanner.

Note: Unscrew the screws uniformly, diametrically, successively to prevent breaking the screw heads in result of the spring pressure.

Remove flange incl. shaft seal and outer rim of bearing (see Fig. 1).

3. Remove from flange shaft seal. Do not dismount outer rim of bearing from flange.

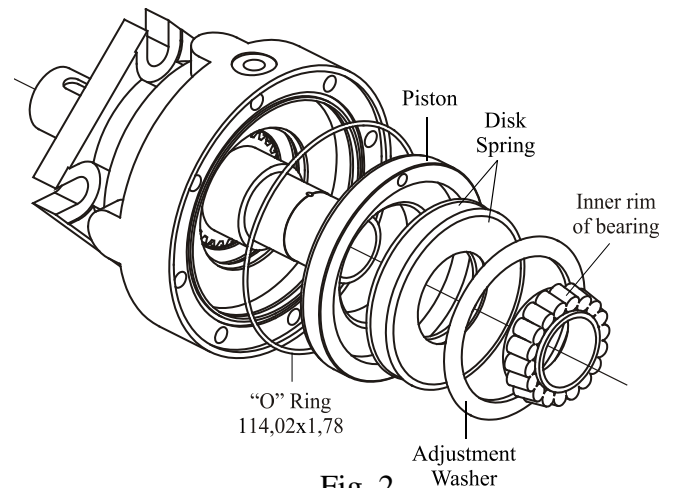


Fig. 2

4. Remove piston from housing. Use special tool with two screws M5x20 screwed in M5 holes to rest in advance and using a puller. Take the O-rings and the Back up rings out of piston and bushing grooves. The piston will come out with inner rim of bearing, adjustment washer and dick springs (see Fig.2).

5. Remove from housing groove O-ring 114,2x1,78.

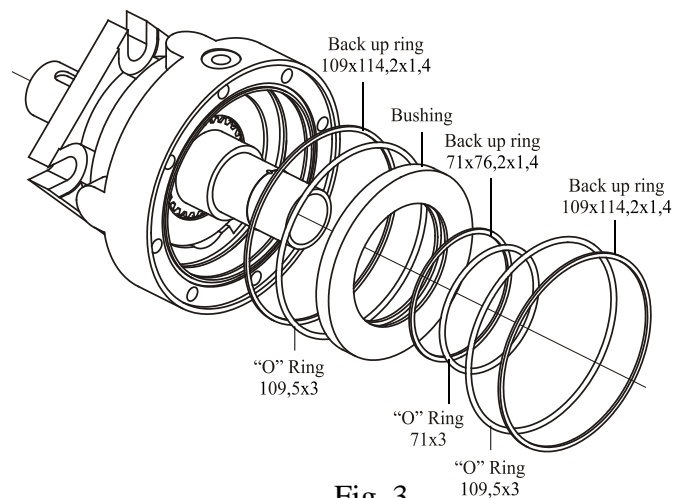


Fig. 3

6. Take the O-ring 109,5x3 and the Back up ring 109x114,2x1,4 out of housing groove (see Fig.3).

7. Remove bushing carefully out of the brake housing using a puller with slight swivelling motions. Remove from bushing groove O-ring 71x3 and Back up ring 71x76,2x1,4.

8. Take the O-ring 109,5x3 and the Back up ring 109x114,2x1,4 out of housing groove (see Fig.3).

9. Remove from housing whole assembly contained shaft, inner rims of front and rear bearings, steel disks, sinter disks and support rings (see Fig.4). Separate the rims from shaft. Check the friction elements for defects (availability of wearing marks and checking the weight) and replace with new ones.

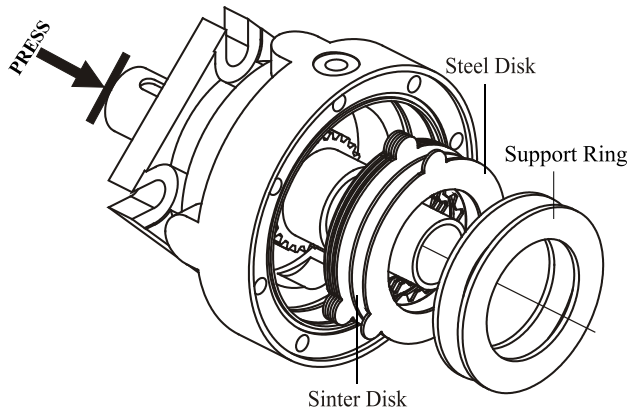


Fig.4

10. With a small screwdriver remove dust seal from housing.

Knock the shaft seal out of housing using a soft bushing and a plastic hammer (see Fig. 5). Do not remove from housing outer bearing rim!

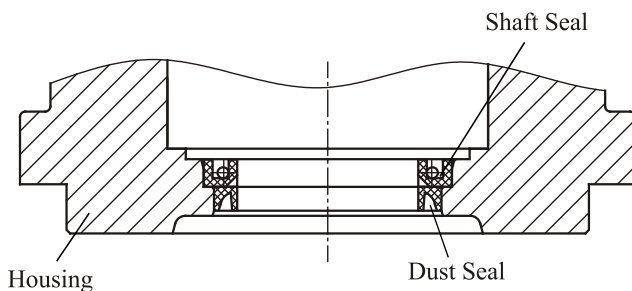


Fig. 5

Seal Kits:

Euro version

SK 41 5127 8032 for LB/288-series 4

SK 41 5127 8000 for LBS[V]/289 and LBS[V]/290

- series 4

SAE version

SK 41 5128 9500 for LB/288 - series 4

SK 41 5128 9544 for LBS/289 and LBS/290 - series 4

SK 41 5128 9619 for LBV/289 and LBV/290 - series 4

1. CLEANING:

Wash all parts (except seals) in a weak solvent on carbon base and then degrease.

2. MEASURING AND REPLACEMENT:

Measure all parts and compare their actual dimensions with the nominal ones given in the technical documentation. Replace any parts with scratches or burrs that could cause leakage or damage with new ones. Use new seals and washers when reassembling the motor.

3. LUBRICATION:

Lubricate all friction parts, which should be reassembled with light film of petroleum jelly.

1. Place lubricated shaft seal (5 bar) in the housing and firmly push with Seal driver (see Fig.6).

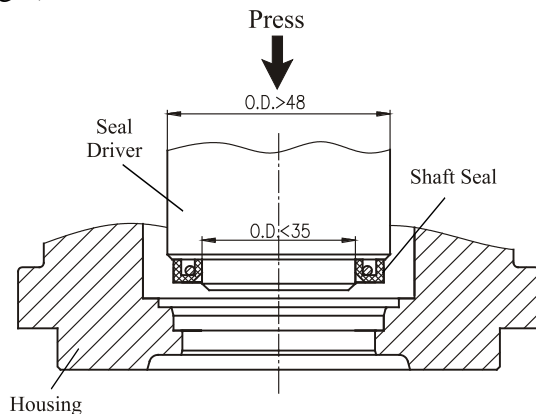


Fig.6

2. If dismantled, stave the outer bearing rim of the front tapered bearing into the housing (with the bigger diameter orientated to the housing) using a bushing made from non-ferrous metal (bronze, brass) and sizes $\varnothing 55 \times \varnothing 61 \times 50$ and a 2000daN press. Fix the housing in reassembly devise (plate with an $\varnothing 83$ hole for LBS[V]/289 or $\varnothing 125$ ($\varnothing 127$) for LBS[V]/290 and two pins on $\varnothing 106$).

3. Stave to the rest over the front part of shaft the inner bearing race and the roller retaining ring of the front tapered roller bearing. Use a small press and an $\varnothing 36 \times \varnothing 42 \times 90$ bushing. Arrange correct the sinter disks beginning and finishing with the steel disk and engaging the sinter disks inner teeth with the shaft outer teeth. Place support disks over friction pack. See Table 1 for correct number of disks.

Place a slightly oiled safety metal cap (for protecting the shaft seal ring lips) on the assembled shaft. Mount carefully the shaft assembly into the housing to the rest!

ATTENTION: Before mounting grease well each friction dick. The external 3 teeth of all steel disks should coincide with the grooves milled in the housing!

4. Mount lubricated O-ring 109x114,2x1,4 (2 pcs.) with back up ring 109,5x3 (2 pcs.) into housing grooves. (see fig.7)

ATTENTION: Orient O-ring to the arch sector of back-up ring.

9. Mount lubricated O-ring 71x3 with back up ring 71x76,2x1,4 into bushing grooves. (see Fig.7)

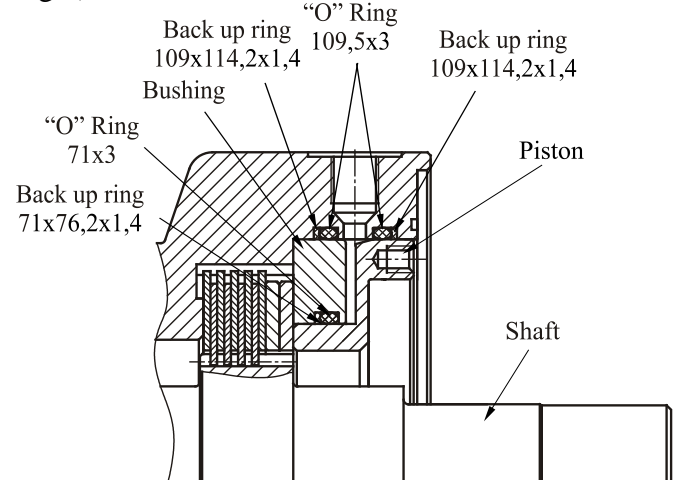


Fig.7

10. Assemble together the lubricated piston and bushing. Mount assembly in brake housing using a hand-power press with guaranteed rectilinear movement.

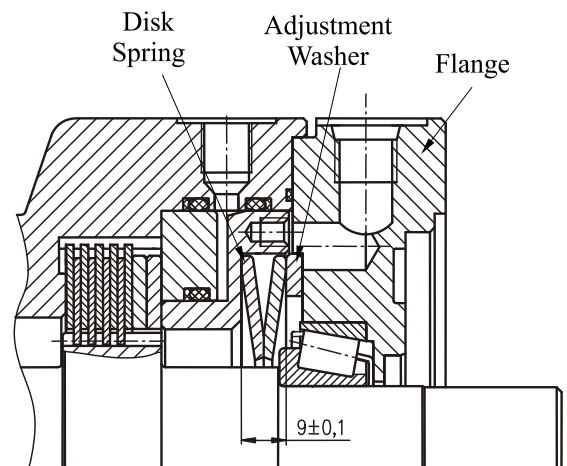


Fig.8

11. Install adjustment washer and disk springs (see Fig. 8).

IMPORTANT! The size of adjustment washer should ensure opening pressure as shown in Table 1 (after mounting of flange the dimension over disk springs should be $9 \pm 0,1$ mm) (see Fig.8).

12. On rear part of shaft stave the inner bearing race of the rear bearing incl. the roller retaining ring. Outer rim is staved in flange.

13. Lubricate and install O-ring 114,2x1,78 in the housing seal groove.

14. Lubricate slightly the internal surface of the flange and orient it as follows:

- drain port in flange should be rotated 11° left of release port in housing (see Fig.1).
- line up the bolt holes of housing and flange.

15. Mount flange to housing with 8 screws M8 and alternately torque them to 2,5÷3,0 daNm using S6 Allen head spanner (see Fig.1).

ATTENTION: The axial clearance between front and rear tapered bearing should be $0,04 \pm 0,1$ mm. It can be realized by decreasing the flange thickness.

16. Install seal on plug and torque to 2,5÷3,0 daNm using S6 Allen head spanner (see Fig.1). For LBS plugs are 3 pcs. and for LBV – 4 pcs.

17. Lubricate flange seal groove and external surface of shaft. Place lubricated shaft seal (high pressure) in the flange and firmly push with Seal driver.

18. Reposition brake assembly with output shaft up. Lubricate dust seal and install in housing seal groove.

19. Install key in shaft key groove. For cone shafts install washer and screw castellated nut.

Disassembly and reassembly of LB/288:

Follow the same disassembly and reassembly procedures as for LBS[V]/289 and LBS[V]/290 except following:

Disassembly:

1. The plugs are mounted in housing, not in flange.

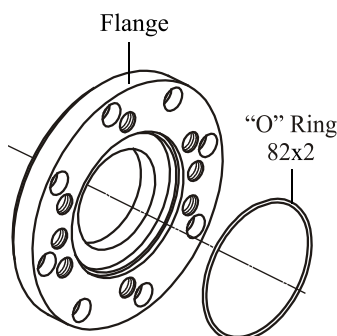


Fig. 9

2. Separate O-ring 82x2 from flange (see Fig.9). There are no rear bearing and shaft seal.

3. After dismounting of piston and bushing turn the brake unit with open side downwards. Shake it slightly on soft surface. Support rings, sinter disks and steel disks will drop out.

4. Reposition brake with output shaft up.

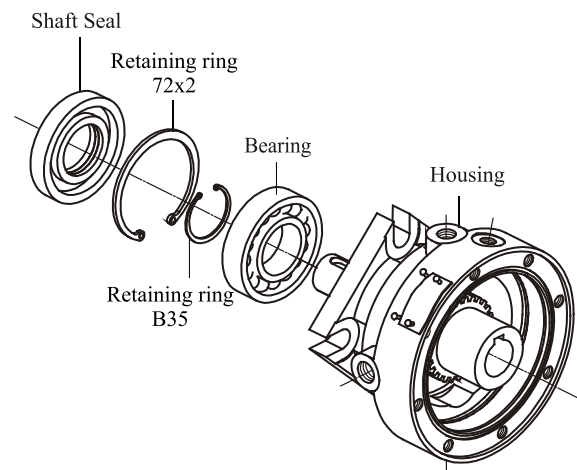


Fig. 10

Remove from housing shaft seal (see Fig.10).

Remove the retaining rings using utility pliers for holes and shaft.

5. Place the brake in disassembly devise (plate with central hole $\varnothing 83$ with two pins opposite staved into it) with the output shaft directed downwards. Separate shaft from housing using a small press. Remove bearing from shaft.

Reassembly:

6. Using a small press and bushing made from non-ferrous metal (bronze, brass) stave to rest the radial bearing over the front part of shaft.

Mount the retaining ring in shaft in front of the bearing (see Fig.10).

7. With a small press stave the assembled shaft in front part of the housing. Mount the retaining ring in housing (in front of the bearing). Note: The retaining rings are correct mounted when could be rotated over shaft axes.

8. Place a safety cap over the shaft journal to protect the seal lips against breaking. With seal driver stave in the housing shaft seal (see Fig.11).

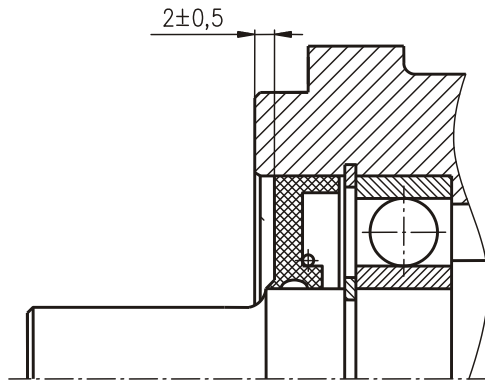


Fig. 11

9. Turn the housing and place it in an assembling fixture (plate with a central hole $\varnothing 83$ and two pins of $\varnothing 106$ diametrically). Arrange the steel and sinter disks successively in the housing along the shaft teeth.

10. After mounting the flange to housing insert lubricated O-ring 82x2 into flange seal groove and place face seal to protect flange surface.

ATTENTION:

1. ** In all brakes, friction disks and separators should be lubricated. Space is filled with $50 \div 120 \text{ cm}^3$ mineral oil HLP (DIN 51524) or HM (ISO 6743/4).

2. Hydraulic brake is delivered without oil (it is lubricated only).

** For LB/288 fill oil after hydraulic motor assembly.

Table 1

Brake type	Steel disk	Sinter disk	Support ring	Opening Pressure		Static torque
				min	max	
				PSI [bar]		in.-lb. [daNm]
LB/288-7	3	2	4	58÷116 [4÷8]	4350 [300]	531÷708 [6÷8]
LB/288-14	3	2	4	116÷232 [8÷16]	4350 [300]	1150÷1327 [13÷15]
LB/288-21 LBS/289-21 LBS/290-21	3	2	4	246÷333 [17÷23]	4350 [300]	1770÷1947 [20÷22]
LB/288-32 LBS/289-32 LBS/290-32	4	3	3	246÷333 [17÷23]	4350 [300]	2743÷3009 [31÷34]
LB/288-43 LBS/289-43 LBS/290-43	5	4	2	246÷333 [17÷23]	4350 [300]	3628÷3982 [41÷45]
LB/288-63 LBS/289-63 LBS/290-63	7	6	-	246÷333 [17÷23]	4350 [300]	5310÷5753 [60÷65]